

## **Determination of Profitability and Resource-Use Efficiency of Yam Production by Women in Bosso Local Government Area of Niger State, Nigeria**

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### **Abstract**

*The study was carried out to determine the profitability and resource-use efficiency of yam production in Bosso Local Government of Niger State, Nigeria. Multi stage sampling technique was used to select women farmers that were used for the study. Data collection was done using a structured questionnaire administered to the women farmers. Data analyses were done using farm budgeting, multiple regression and MVP/MFC ratio. Result of the farm budgeting revealed that farm labour was the most important cost item accounting for 45.97% of the total cost of yam production by women. A net profit of ₦10, 314.32/ha was realized representing 27.96% of the total cost/ha. Result of the multiple regression showed that fertilizer ( $P<0.01$ ), labour ( $P<0.01$ ) and farm size ( $P<0.05$ ) have had significant positive contributions to the farm output. However, result of the MVP/MFC ratio test revealed that both farm size, fertilizers and farm labour were underutilized by the yam producing women farmers. It was then concluded that, although yam production activity of the women was profitable, the level of productivity was not at optimum. In order for them to produce at the optimum level, however, the levels of farm size, fertilizers and farm labour use should be increased.*

**Key words:** Profitability, Resource-use, Yam, Production, Women

### **Introduction**

According to FAO (2008), yam production in Nigeria has nearly doubled since 1985, with Nigeria producing 35 million metric ton per year with value equivalent to ₦848.1 billion. In perspective, the world's second and third largest producers of yams, Côte d'Ivoire and Ghana, only produced 6.9 and 4.8 tons of yams in 2008 respectively. According to the International Institute of Tropical Agriculture (IITA) (2003), Nigeria accounted for about 70 percent of the world production amounting to 17 million tons from 2,837,000 hectares land area under yam cultivation. In Nigeria's many yam-producing areas, it is often proclaimed that "yam is food and food is yam." Yam also has an important social place in special gatherings and religious functions, and a farm family status is judged by the size of yam holdings it possesses.

Women in Nigeria form an active and reserve labour force but they rarely own the means of production (Rahman, 2004). However, the position of women in meeting challenges of agricultural development cannot be over emphasized.

Women make a significant contribution to food production; they provide 60-80% of agricultural labour and are responsible for 80% of food production (Mgbada, 2002; Rahman, 2004). Despite the immense contributions of women to economic advancement of both household and national economies, women are constantly faced with diverse socio-economic, political and cultural factors which have continued to hinder the realization of their potentials in agricultural production. These factors had resulted in their poor and inadequate access to production resources and services (Gabriel, 1993). Moreover, the problems of inputs availability at the required period and at reasonable costs have continued to affect the optimal increase in agricultural production and productivity by women farmers (Akande and Igbi, 1984). It is upon this background that this study was carried out to examine the profitability and resource-use efficiency in yam production by women farmers in Bosso local Government Area of Niger state.

## **Methodology**

### **The Study Area**

Bosso Local Government Area was created in 1991. It has a population of 147,359 people (NPC, 2006). It lie on longitude 6<sup>0</sup>28'E and latitude 9<sup>0</sup>14'N. It is one of the 25 Local Government Areas in Niger State. Bosso Local Government Area is predominantly inhabited by the Gwari people and other tribes like Nupe, Hausa, Koro, Kadara and Yoruba.

The climate of Bosso Local Government Area is similar to what is obtained in most part of Niger State. The mean annual temperature varies between 21.11<sup>0</sup>C (70<sup>0</sup>F) and 37.78<sup>0</sup>C (100<sup>0</sup>F). This variation depends on the humidity in winter and summer. The area receives an annual rainfall of about 680mm.

The rainy season lasts for eight months from March to November after which the dry season commences. The dry season begins from December to March, and is usually characterized by low economic activities (Amos, 1995).

Farming is the main occupation of both men and women in the area. Although women are involved in to farming because it is their last resort under rainfed agriculture, they produce varieties of crops like yam, rice, maize, groundnut and so on. They also produce leafy vegetables during the dry season and they rear livestock like goats, sheep and poultry in the area.

### **Sampling procedure and Data collection**

The study was conducted in Bosso Local Government Area of Niger State. A multistage sampling technique was adopted for the study. At the first stage, three administrative districts out of eight (8) administrative districts that constituted Bosso Local Government were randomly selected. The second stage involved random selection of two villages from each of the three selected districts and the third stage involved random selection of twenty (20) women farmers from each of the selected villages giving a total of one hundred and twenty (120) women farmers used for the study.

Primary data used for the study were collected by means of a structured questionnaire administered to women farmers engaged in yam production in the study area. Secondary data were obtained from relevant literature sourced from journals, internet, text books, etc.

### **Data Analysis**

Costs and return in yam production was analyzed using farm budgeting model (Gross and net-farm income analysis) following Olukosi and Erhabor, (2005). The net farm income model is specified as

$$NFI = GR - (TFC + TVC) \dots \dots \dots (1)$$

Where;

NFI = Net farm income (₦)

GR = Gross revenue (₦)

TFC = Total fixed costs (₦)

TVC = Total variable costs (₦)

The nature of the relationship between inputs and output was analyzed using the production. The general form of the production function for yam production in the area of study was as follows:-

$$Y = f(X_1, X_2, X_3, X_4, X_5) \dots \dots \dots (1)$$

Where Y = Yam output (kg/ha)

X<sub>1</sub> = Labour (man days)

X<sub>2</sub> = Quality of setts used (kg/ha)

X<sub>3</sub> = Farm size (ha)

X<sub>4</sub> = Quaity of fertilisers (kg/ha)

X<sub>5</sub> = Agrochemicals (litre/ha)

Different functional forms were specified and analysed to select the equation with the best fit. The linear function form was specified as follows:

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + e \dots \dots \dots (2)$$

The log-linear functional form was specified as follows:

$$\text{Log } Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + e \dots \dots \dots (3)$$

The linear-log functional form was specified as follows:-

$$Y = b_0 + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + e \dots \dots \dots (4)$$

The transformed Cobb-Douglas functional form was specified as follows:

$$\text{Log } Y = b_0 + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + e \dots \dots \dots (5)$$

Where in equations 2- 5 above;

b<sub>0</sub> = constant term

b<sub>1</sub>-b<sub>5</sub> = regression coefficients

e = error term

X<sub>1</sub>-X<sub>5</sub> = as difined in equation (1) above

OLS was used in the estimation of regression coefficients in equations 1-5 using SPSS version 10. On the basis of the economic and economic criteria such as the *a priori* expectations of the signs and magnitudes of the coefficients,

significance of the R<sup>2</sup>-value, F-ratio and t-ratio following Olayemi (1998) , the linear form of the equation (equation 2) appeared to be the best fit and was therefore chosen as the lead equation.

### Results and Discussion

Table 1 shows cost and return structure of yam production in the study area. The table depicted that ₦23, 867.38 representing 64.42% of the total cost was spent on variable cost items/ha and the remaining ₦13, 183.47 representing 35.58% of the total cost was spent on fixed cost items/ha. This implies that variable cost where the most important cost items in yam production in the study area compares to the fixed cost items. Among, the variable cost items, ₦17,030.51 representing 45.97% of the total cost was spent on labour/ha. This means that labour was the most important variable cost item in yam production.

Maikasuwa *et.al.* (2009) obtained up to 63.28% and 72.27% of the total cost spent on labour/ha in pepper production by the Fadama participating and non-participating households, respectively. Similarly, Abubakar *et.al.* (2009) realized that 72% of the total cost of onion production was spent on labour. The table revealed further that an average of ₦10, 314.32/ha representing 27.96% of the total cost incurred in the production of yam was realized as net profit/ha. This means that yam cultivation in the study area was profitable. It is therefore desirable that more women should be encouraged to engage in yam production so that income generating capacity of women farmers in the study area can be boosted.

**Table 1: The Average costs and return of yam produced per hectare**

Item	Amount/Ha	% of total cost/Ha
<b>Gross income</b>	47410.17	
Variable costs:		
Labour	1, 7030.51	45.97
Setts used	2,751.27	7.42
Fertilizer	2,938.14	7.93
Agrochemicals	1,147.46	3.10
<b>Total Variable cost (TVC)</b>	<b>23,867.38</b>	<b>64.42</b>
Fixed Costs:		
Farm tool (Depreciation)	13,183.47	35.58
<b>Total Fixed Cost (TFC)</b>	<b>13,183.47</b>	<b>35.58</b>
<b>Total Cost (TC)</b>	<b>(23,999.21)</b>	<b>100</b>
<b>Net Farm Income</b>	<b>(7,987.29)</b>	<b>27.96</b>

Source: Field survey, 2012

Table 2 shows result of the linear production function obtained for yam production by women. An  $R^2$  value of 0.893 was obtained implying that about 89% of the variations in yam production was caused by the variations in the independent variables consider in the model and only 19% of the variation in yam production was caused by other factors not considered in the equation. In yam production, fertiliser ( $x_4$ ) labour ( $x_1$ ) and farm size ( $x_3$ ) have had significant positive effect on yam output.

This implies that increasing the qualities of either fertilisers ( $P < 0.001$ ), labour ( $P < 0.001$ ) or farm size ( $P < 0.05$ ) by one unit will bring about a corresponding increase in the output of yam by 0.071, 0.017 and 0.029 units, respectively. Earlier study conducted by Tyabo *et. al.* (2010) on yam production by in the same study area showed that while farm size had similar significant positive effect on output, labour did not did not have any significant effect on output.

Another study carried out by Tsado et.al. (2010) revealed that while labour and farm size had significant positive effect on output, fertilizer had a significant but negative effect on output. Thus, in order to generate more output from yam by women in the study area, the quantities of fertilisers, labour and farm size utilised by should be increased.

Increase in the quantity of fertiliser used by women can be achieved through subsidies by the government. The level of farm size can be increased by incorporating change in land tenure system which allows equal ownership of farm lands respectively of gender or sex. Labour can be increase by using modern yam production techniques which allows for the utilisation of modern tools and machineries.

**Table 2: Estimated linear production function for yam production by women farmers**

Variables	Beta coefficient	t-value
Contant term	144.735	2.735***
Setts (x <sub>2</sub> )	0.048	1.570
Fertilizer(x <sub>4</sub> )	0.078	2.537***
Agro-chemicals(x <sub>5</sub> )	-0.034	-0.790
Labour (x <sub>1</sub> )	0.017	5.036***
Farm size (x <sub>3</sub> )	5.444	0.811**
R square = 0.893		

\*\*\* Significant at 1 % level of probability, \*\* Significant at 5 % level of probability,  
Source: Field survey 2012.

***Determination of the Level of Resource Use***

One of the methods of assessing the level of resource use efficiency in agricultural production is by determining the ratio of the Marginal Value Produced (MVP) to Marginal Factor Cost (MFC). Under this method, the decision rules are that, when;

MVP/MFC >1, the level of resource use is below the optimum level, implying under utilisation of resources

MVP/MFC <1, the level of resources use is above the optimum level, implying over utilisation of resources.

MVP/MFC = 1, the level of resource use is at optimum implying efficient resource utilisation.

Where

MVP = value of change in output resulting from a unit change in variable input (₦)

MFC) = price paid for the unit of variable input (₦).

Table 3 shows estimated resources use efficiency in yam production by women farmers. It is revealing from the table that all the resources considered were under utilized by the women engaged in yam production. The resource under utilization established may not be unconnected with the limited access to farm resource usually faced by women farmers in Nigeria. In order to increase the level of resource use by the women farmers, however, there is the need to not only extend farm credit and subsidize the cost of farm inputs such as

labour and fertilizer the women engaged in yam production, but they should also be allowed to have increased access to farm land to enable them expand the scope of their farm sizes. Doing this would allow yam output to be increased in the area and the country in general, at the same time, enhancing the income generating capacity of the yam producing women. This shall go a long way to bringing about increase in the standard of living of women engaged in yam production.

**Table 3: Estimated resource-use efficiency in yam production by women farmers**

Farm input	Coefficients	MVP	MFC(N)	MVP/MFC
Fertilizer(ka/ha)	0.078	2938.14	2000	1.47
Labour(man-day)	0.017	17030.5	371	45.9
Farm size	1.811	2752.09	2300	1.20

Source: Field survey, 2012

### ***Conclusion and Recommendations***

Based on the study outcome, it was concluded that, yam production by women in the study area was profitable although the level of resource use was not at optimum. In order to attain optimum (i.e. technical optimum) resource use by the yam producing women in the study area, levels of farm size, fertilizers and

farm labour need to be increased. Fertilizer level can be increased through subsidize, farm labour can be enhanced by using improved yam cultivation tools and farm size can be increased by incorporating changes in land tenure system which allow equal ownership of land holdings by men and women.

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